Printed Pages : 4

NEE-409

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 121413

Roll No.

B. Tech.

(SEM. IV) THEORY EXAMINATION, 2014-15
ELECTRIC MACHINE & AUTOMATIC CONTROL

Time : **3** Hours]   [Total Marks : **100**

1   Attempt any four of the following :   4×5=20

(a)   Explain the different speed control methods used in a DC motor.

(b)   Discuss conversion from 3 phase to 2 phase using Scott connection.

(c)   Briefly enumerate the working of auto transformer with its merits, demerits.

(d)   A 10 kva single phase 500/250 v transformer gave following test.

OC TEST	250 V	3A	200W
SC TEST	15V	30A	300W

Find efficiency and regulaton at full load 0.8 p.f. Lagging ?

(e)   Why series motor is never start on no load, also explain application of DC series and shunt motor.

(f)   Why starter is required in DC motor ? Explain different method of starting.

2   Attempt any two of the following :   10×2=20

(a)   (i)   Explain the working principle of 3-phase induction motor. The rotor of induction motor cannot run at synchronous speed. Explain. Why ?

(ii)   3-ϕ induction motor is wound for 4 poles and is supplied from 50 Hz system. Calculate

(a)   synchronous speed

(b)   rotor speed when slip is 4% and

(c)   rotor frequency when rotor runs at 600 rpm.

(b)   Explain the working of two phase servo motor and their application.

(c)   Explain the following :

(i)   Synchronizing of alternators

(ii)   V-curve of synchronous motor

3   Attempt any two of the following :   10×2=20

(a)   Compare open loop and closed loop system with suitable examples.

(b)   Obtain differential equation describing equivalent mechanical system of fig. 1 and draw the equivalent F-V analogy.
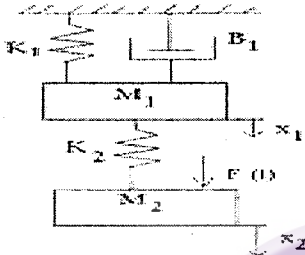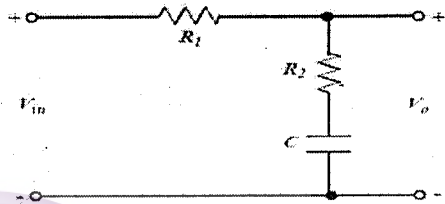

Fig. 1   Fig. 2

(c)   What do you mean by Transfer Function; find out Transfer Function for Fig. 2 circuit.

4   Attempt any two of the following ;   10×2=20

    (a)   Find out steady type error with unit step, ramp and parabolic input for

        (i)   type zero

        (ii)   type one

        (iii)   type two system

    (b)   (i)   Explain bounded i/p bounded o/p stability criterion.

        (ii)   Find stability condition for following characteristics equation

$$S^3 + 2ks^2 + (k+2)*s + 4=0$$

(c)   Draw polar plot for G(s) = K / (sA + 1)*(sB+1) for unity feedback system, find Gain margin, phase margin.

5   Attempt any two of the following :   10×2=20

(a)   Draw bode plot and determine G.M., P.M., comment on stability.

G(s) H(s) = 16 (1+0.5s) / s^2 * (1+0.125s) * (1+0.1s)

(b)   Explain the Proportional, Derivate, Integral controller and write their advantages.

(c)   construct root locus for

G (s) H (s) = k/s* (s+4) * (s+5)   K > 0